What is claimed is:

1   1. An apparatus comprising:

2   an IP wrapper circuit;

3   a packet switch;

4   one or more cherrypicker multiplexers; and

5   a local area network coupling said IP wrapper to said packet switch and

6   coupling said packet switch to said one or more cherrypicker multiplexers.

1   2. The apparatus of claim 1 wherein said cherrypicker multiplexers and said packet

2   switch cooperate to receive data indicating video programs to be transmitted downstream to

3   customers over DSL lines, cable television hybrid fiber coaxial cable networks or satellite

4   downlinks and to receive MPEG data encapsulated in IP packets which are encapsulated in

5   local area network packets from said IP wrapper circuit and to pick out only the MPEG

6   packets containing data encoding the video programs which are to be transmitted and

7   assemble said MPEG packets into MPEG transport streams, and wherein said cherrypicker

8   multiplexers further comprise circuitry to adjust the bandwidth of the MPEG transport

9   streams so generated to match the available bandwidth to transport and/or process the data

1 0 of said video program(s).

1 1

1   3. An apparatus comprising:

2   one or more video servers that output MPEG transport streams;

3   one or more satellite feeds that output MPEG transport streams;

4   an IP wrapper circuit coupled to said one or more video servers and said one

5   or more satellite feeds;

6   a packet switch;

7   one or more cherrypicker multiplexers; and

8   a local area network coupling said IP wrapper to said packet switch and

9   coupling said packet switch to said one or more cherrypicker multiplexers;

1 0   means for receiving upstream requests for video-on-demand programs and

1 1 sending data to said cherrypicker multiplexers which identify the requested

1 2 programs; and

13   means for sending data to said one or more video servers and/or satellite

14   feeds identifying which video program data should be sent to said cherrypicker

15   multiplexers through said IP wrapper circuit, said local area network and said

16   packet switch for assembly into MPEG transport streams for transmission to

17   customers which made said upstream requests.

18

1   4. An apparatus comprising:

2   one or more video servers that output MPEG transport streams;

3   one or more satellite feeds that output MPEG transport streams;

4   one or more web servers;

5   any one or more other types of servers on which applications programs may

6   be run remotely from customer sites;

7   an IP wrapper circuit coupled to said one or more video servers and said one

8   or more satellite feeds;

9   a packet switch coupled to said one or more web servers and said any one or

10   more other types of servers;

11   one or more cherrypicker multiplexers;

12   a local area network coupling said IP wrapper to said packet switch and

13   coupling said packet switch to said one or more cherrypicker multiplexers; and

14   upstream channel means for receiving upstream requests from customers for

15   video programs and requests or commands to obtain data from the internet via said

16   web server or execute application programs on said other servers, and for

17   identifying the requested video programs to the appropriate one or more of said video

18   servers or satellite feeds and to send said request for data and commands to the

19   appropriate web server or any other type of server;

20   and wherein said IP wrapper circuit and said packet switch cooperate to

21   packetize said requested video program data appropriately and route said packetized

22   video data and other requested data output by said one or more web servers and said

23   any one or more other types of servers to the appropriate one or more of said

24   cherrypicker multiplexers for transmission to the one or more customers who

25   requested said data.

5. The apparatus of claim 4 wherein said cherrypicker multiplexers further comprise means for adjusting the bandwidth of data to be sent to customers to lesser bandwidths if necessary.

1 6. An apparatus comprising:

2   an IP wrapper circuit for receiving MPEG transport streams on one or more

3 inputs and mapping the program identification codes (hereafter PID) and input

4 number for each MPEG packet in each said transport stream into an IP packet header

5 multicast destination address and encapsulating one or more of said MPEG packets

6 having the same PID and input number into an IP packet and encapsulating each IP

7 packet into a LAN packet having an LAN packet destination address which is a

8 multicast address but which is unique to the PID and input number of the MPEG

9 packets enclosed therein;

10   a local area network coupled to said IP wrapper circuit;

11   a packet switch coupled to said IP wrapper circuit via said local area

12 network;

13   one or more cherrypicker multiplexers coupled to said packet switch via said

14 local area network, each functioning to receive data defining which programs have

15 been requested by one or more customers or which is to be transmitted regardless of

16 requests for it and generating and transmitting to said packet switch one or more

17 packets identifying by LAN packet destination address the LAN packets said packet

18 switch is to route to said cherrypicker multiplexer, and for receiving from said

19 packet switch the requested LAN packets encapsulating MPEG data and assembling

20 MPEG transport streams that are to be sent to said customers containing data

21 encoding the programs which have been requested or which are to be transmitted

22 regardless of request, and encapsulating MPEG packets from said transport streams

23 into UDP/IP or TCP/IP packets.

24

1 7. The apparatus of claim 6 further comprising an IP dewrapper circuit coupled to

2 said cherrypicker multiplexers through said packet switch and said local area network and

3 functioning to receive LAN packets encapsulating UDP/IP or TCP/IP packets which

4 encapsulate at least MPEG packet data and which are addressed to said IP dewrapper circuit,

5   said IP dewrapper circuit functioning to strip off the LAN packet header and UDP/IP or

6   TCP/IP packet header and output a pure MPEG transport stream, and wherein said

7   cherrypicker multiplexers function to encapsulate the UDP/IP or TCP/IP packets they

8   generate in LAN packets addressed to said IP dewrapper circuit and transmit them over said

9   local area network to said packet switch.

10

1   8. The apparatus of claim 6 further comprising dedicated data paths from each said

2   cherrypicker to one or more DSL modems or cable modems or satellite uplink facilities.

3

1   9. The apparatus of claim 6 further comprising a second local or wide area network

2   of a different type than the type of local area network coupled to said packet switch, such as

3   an ATM cell network, coupling said cherrypicker multiplexers to one or more DSL modems

4   or cable modems or satellite uplink facilities.

5

1   10. The apparatus of claim 6 further comprising means for receiving upstream

2   requests for video-on-demand programs or other TCP/IP packetized data from the internet

3   or other sources and for transmitting those requests to said cherrypicker multiplexers.

4

1   11. The apparatus of claim 10 wherein said cherrypicker multiplexers convert said

2   requests to particular PIDs and input number, and generate and send to said packet switch

3   LAN packets identifying the particular LAN packets by LAN destination address which will

4   carry the data requested in the upstream request.

5

1   12. The apparatus of claim 11 wherein said packet switch further functions to

2   receive said LAN packets identifying LAN packets to be routed to said cherrypicker

3   multiplexers and generates and sends messages to the appropriate source of the requested

4   data requesting that the requested data be sent to said packet switch.

1   13. The apparatus of claim 6 further comprising a web server coupled to the

2   internet and a local area network connection between said web server and said packet switch.

1   14. The apparatus of claim 6 further comprising a wide are network data path

2   between said packet switch and one or more other cable system headends or DSL central

3   offices or satellite uplink facilities such that requested data may be received from said one

4   or more other cable system headends or DSL central offices or satellite uplink facilities.

1   15. An apparatus comprising:

2   one or more video servers and/or satellite uplink/downlink circuitry that

3   output MPEG transport streams encoding one or more video programs;

4   an IP wrapper circuit for receiving MPEG transport streams on one or more

5   inputs coupled to said one or more video servers and/or satellite receivers, and

6   mapping the program identification codes (hereafter PID) and input number for each

7   MPEG packet in each said transport stream into an IP packet header multicast

8   destination address and encapsulating one or more of said MPEG packets having the

9   same PID and input number into an IP packet and encapsulating each IP packet into a

10   LAN packet having an LAN packet destination address which is a multicast address but

11   which is unique to the PID and input number of the MPEG packets enclosed therein;

12   a local area network coupled to said IP wrapper circuit;

13   a packet switch coupled to said IP wrapper circuit via said local area

14   network;

15   one or more cherrypicker multiplexers coupled to said packet switch via said

16   local area network, each functioning to receive data defining which programs have

17   been requested by one or more customers or which is to be transmitted regardless of

18   requests for it and generating and transmitting to said packet switch one or more

19   packets identifying by LAN packet destination address the LAN packets said packet

20   switch is to route to said cherrypicker multiplexer, and for receiving from said

21   packet switch the requested LAN packets encapsulating MPEG data and assembling

22   MPEG transport streams that are to be sent to said customers containing data

23   encoding the programs which have been requested or which are to be transmitted

24   regardless of request, and encapsulating MPEG packets from said transport streams

25   into UDP/IP or TCP/IP packets addressed either to the host and process on said host

26   at a customer site to which the data is to be sent or to an IP dewrapper circuit

27   coupled by said local area network to said packet switch and which does not form part

28   of the invention of this claim;

29   means for receiving upstream requests for video-on-demand programs or

30   other TCP/IP packetized data from the internet or other sources and for transmitting

31   those requests to said cherrypicker multiplexers;

32   and wherein said cherrypicker multiplexers convert said upstream requests

33   to particular PIDs and input numbers, and generate and send to said packet switch

34   LAN packets or other messages identifying the particular LAN packets to be routed to

35   each said cherrypicker multiplexer by LAN destination address, said LAN packet to be

36   routed to said cherrypicker multiplexers being ones which will carry the video

37   programs and other data requested in the upstream requests;

38   and wherein said packet switch functions to receive said LAN packets or

39   messages identifying the requested LAN packets and generates and sends LAN packets

40   or other messages to said one or more video servers and/or satellite

41   uplink/downlink circuitry requesting that the requested data be transmitted to said

42   IP wrapper circuit.

1   16. The apparatus of claim 15 further comprising an IP dewrapper circuit coupled

2   to said packet swtich via said local area network and functioning to receive LAN packets

3   encapsulating UDP/IP or TCP/IP packets encapsulating MPEG data and strip off said LAN

4   packet header and said UDP/IP packet header and output a pure MPEG transport stream, and

5   wherein said cherrypicker multiplexers address said UDP/IP or TCP/IP packets to said IP

6   dewrapper circuit and further function to encapsulate said UDP/IP or TCP/IP packets into

7   LAN packets addressed to said IP dewrapper circuit.

1   17. An apparatus comprising:

2   one or more video servers and/or satellite uplink/downlink circuitry that

3   output MPEG transport streams encoding one or more video programs;

4   one or more web servers coupled to the internet;

5   an IP wrapper circuit for receiving MPEG transport streams on one or more

6   inputs coupled to said one or more video servers and/or satellite receivers, and

7   mapping the program identification codes (hereafter PID) and input number for each

8   MPEG packet in each said transport stream into an IP packet header multicast

9   destination address and encapsulating one or more of said MPEG packets having the

10   same PID and input number into an IP packet and encapsulating each IP packet into a

11   LAN packet having an LAN packet destination address which is a multicast address but

12   which is unique to the PID and input number of the MPEG packets enclosed therein;

13   a local area network coupled to said IP wrapper circuit and said one or more

14   web servers;

15   a packet switch coupled to said IP wrapper circuit and said one or more web

16   servers via said local area network;

17   one or more cherrypicker multiplexers coupled to said packet switch via said

18   local area network, each functioning to receive data defining which programs have

19   been requested by one or more customers or which is to be transmitted regardless of

20   requests for it and generating and transmitting to said packet switch one or more

21   packets identifying by LAN packet destination address the LAN packets said packet

22   switch is to route to said cherrypicker multiplexer, and for receiving from said

23   packet switch the requested LAN packets encapsulating MPEG data and assembling

24   MPEG transport streams that are to be sent to said customers containing data

25   encoding the programs which have been requested or which are to be transmitted

26   regardless of request, and encapsulating MPEG packets from said transport streams

27   into UDP/IP or TCP/IP packets addressed either to the host and process on said host

28   at a customer site to which the data is to be sent or to an IP dewrapper circuit

29   coupled by said local area network to said packet switch and which does not form part

30   of the invention of this claim;

31   means for receiving upstream requests for video-on-demand programs or

32   other TCP/IP packetized data from the internet or other sources and for transmitting

33   those requests to said cherrypicker multiplexers;

34   and wherein said cherrypicker multiplexers convert said upstream requests

35   to particular PIDs and input numbers or any format suitable for communicating to

36   the source of the requested data what data was requested, and generate and send to said

37   packet switch LAN packets or other messages identifying the particular TCP/IP data

38   encapsulated in LAN packets and/or LAN packets encapsulating video program data to

39   be routed to each said cherrypicker multiplexer, said LAN packets being identified by

TER-010 Spec 8/00   51

40 LAN destination address, said LAN packet to be routed to said cherrypicker
41 multiplexers being ones which will carry the video programs and/or other TCP/IP
42 packetized data requested in said upstream requests;
43   and wherein said packet switch functions to receive said LAN packets or
44 messages identifying the requested LAN packets and generates and sends LAN packets
45 or other messages to said one or more video servers and/or satellite
46 uplink/downlink circuitry requesting that the requested video data be transmitted to
47 said IP wrapper circuit and that the requested TCP/IP data be transmitted to said
48 packet switch, said packet switch functioning to receive LAN packets encapsulating
49 the requested video and/or TCP/IP packetized data and route said LAN packets to the
50 cherrypicker multiplexer that requested said data.

1   18. The apparatus of claim 17 further comprising an IP dewrapper circuit coupled
2 to said packet swtich via said local area network and functioning to receive LAN packets
3 encapsulating UDP/IP or TCP/IP packets encapsulating MPEG data and strip off said LAN
4 packet header and said UDP/IP packet header and output a pure MPEG transport stream, and
5 wherein said cherrypicker multiplexers address said UDP/IP or TCP/IP packets to said IP
6 dewrapper circuit and further function to encapsulate said UDP/IP or TCP/IP packets into
7 LAN packets addressed to said IP dewrapper circuit.

1   19. A process for supplying video data to consumers, comprising the steps of:
2   (1) receiving one or more MPEG transport streams containing data encoding
3 video programs to be transmitted to one or more consumers;
4   (2) encapsulating one or more MPEG packets having the same program
5 identification code and input multiplex number (together hereafter referred to as a
6 PID) from said transport streams in the payload portion of an internet protocol
7 packet (hereafter referred to as an IP packet) and mapping the PID of the
8 encapsulated MPEG packets into an IP multicast address used as the destination
9 address of said IP packet;
10   (3) encapsulating each said IP packet in a local area network packet and
11 mapping said IP packet multicast destination address into a multicast destination
12 address for the local area network destination address which is unique for each PID;

13   (4) transmitting said local area network packets so generated over said local

14   area network to a packet switch;

15   (5) receiving in said packet switch from each of said one or more

16   cherrypicker multiplexers one or more local area network packets containing data

17   indicating the video program data to be routed to said cherrypicker multiplexer and

18   routing incoming local area network packets containing data specified by a

19   cherrypicker multiplexer as desired data to said cherrypicker multiplexer;

20   (6) in each cherrypicker multiplexer, sorting incoming MPEG packets by

21   their PIDs into one or more MPEG transport streams to be transmitted to one or

22   more customers and packetizing each MPEG transport stream into TCP/IP or UDP/IP

23   packets.

24

1   20. The process of claim 19 wherein step (5) includes at least receiving from each

2   cherrypicker multiplexer one or more local area network packets containing data indicating

3   video program data which has been requested by one or more customers being served by said

4   cherrypicker multiplexer, and wherein step (6) further comprises packetizing MPEG

5   packets from each MPEG transport stream encoding a video-on-demand program which has

6   been requested by a customer in TCP/IP or UDP/IP packets addressed to the host and

7   particular process on that host which requested said video-on-demand data.

1   21. The process of claim 19 wherein step (5) includes at least receiving from each

2   cherrypicker multiplexer one or more local area network packets containing data indicating

3   video program data which has been requested by one or more customers being served by said

4   cherrypicker multiplexer, and wherein step (6) further comprises packetizing MPEG

5   packets from each MPEG transport stream encoding a video-on-demand program which has

6   been requested by a customer in TCP/IP or UDP/IP packets addressed to an MPEG transport

7   stream generating process in one of one or more IP dewrapper circuits which transmits

8   MPEG transport streams to customers, the particular IP dewrapper circuit to which said

9   TCP/IP or UDP/IP packets encoding a particular video-on-demand program are addressed

10   being the one which transmits an MPEG transport stream to a customer which requested said

11   video-on-demand program, and further comprising the step of encapsulating said TCP/IP or

12   UDP/IP packets in a local area network packet addressed to said IP dewrapper circuit.

1   22. The process of claim 21 further comprising stripping off the local area network

2   packet headers and TCP/IP or UDP/IP packet headers from said local area network packets

3   encapsulating the MPEG packets which encode a particular video-on-demand program and

4   transmitting said MPEG packets to the customer which requested said video-on-demand

5   program as an MPEG transport stream which is modulated in any way and multiplexed, if

6   necessary, in any way onto any suitable downstream logical and physical channel.

1   23. The process of claim 19 wherein step (6) further comprises the steps of:

2   receiving data indicating the available bandwidth for MPEG packet encoding

3   particular video programs;

4   decompressing at least partially the MPEG packets received in each

5   cherrypicker multiplexer;

6   recompressing the video data from MPEG packets encoding each particular

7   video program to the available bandwidth specified for that particular video

8   program; and

9   repacketizing the video data into MPEG packets in an MPEG transport stream.

1   24. The process of claim 20 wherein step (6) further comprises the steps of:

2   receiving data indicating the available bandwidth for MPEG packet encoding

3   particular video programs;

4   decompressing at least partially the MPEG packets received in each

5   cherrypicker multiplexer;

6   recompressing the video data from MPEG packets encoding each particular

7   video program to the available bandwidth specified for that particular video

8   program; and

9   repacketizing the video data into MPEG packets in an MPEG transport stream.

1   25. The process of claim 21 wherein step (6) further comprises the steps of:

2   receiving data indicating the available bandwidth for MPEG packet encoding

3   particular video programs;

4   decompressing at least partially the MPEG packets received in each

5   cherrypicker multiplexer;

6   recompressing the video data from MPEG packets encoding each particular

7   video program to the available bandwidth specified for that particular video

8   program; and

9   repacketizing the video data into MPEG packets in an MPEG transport stream.

1   26.   The process of claim 21 wherein step (6) further comprises the steps of:

2   receiving data indicating the available bandwidth for MPEG packet encoding

3   particular video programs;

4   decompressing at least partially the MPEG packets received in each

5   cherrypicker multiplexer;

6   recompressing the video data from MPEG packets encoding each particular

7   video program to the available bandwidth specified for that particular video

8   program; and

9   repacketizing the video data into MPEG packets in an MPEG transport stream.

1   27.   A process for supplying video data to consumers, comprising the steps of:

2   (1) receiving one or more MPEG transport streams containing data encoding

3   video programs to be transmitted to one or more consumers;

4   (2) encapsulating one or more MPEG packets having the same program

5   identification code and input multiplex number (together hereafter referred to as a

6   PID) from said transport streams in the payload portion of an internet protocol

7   packet (hereafter referred to as an IP packet) and mapping the PID of the

8   encapsulated MPEG packets into an IP multicast address used as the destination

9   address of said IP packet;

1 0   (3) encapsulating each said IP packet in a local area network packet and

1 1   mapping said IP packet multicast destination address into a multicast destination

1 2   address for the local area network destination address which is unique for each PID;

1 3   (4) transmitting said local area network packets so generated over said local

1 4   area network to a packet switch;

15   (5) receiving in said packet switch from each of said one or more

16 cherrypicker multiplexers one or more local area network packets containing data

17 indicating the video-on-demand program data which has been requested by one or

18 more customers and which is to be routed to said cherrypicker multiplexer and

19 routing incoming local area network packets containing data specified by a

20 cherrypicker multiplexer as desired data to said cherrypicker multiplexer;

21   (6) in each cherrypicker multiplexer, sorting incoming MPEG packets by

22 their PIDs into one or more MPEG transport streams to be transmitted to one or

23 more customers and further comprising the steps of packetizing MPEG packets from

24 each MPEG transport stream encoding a video-on-demand program which has been

25 requested by a customer in TCP/IP or UDP/IP packets addressed to an MPEG

26 transport stream generating process in one of one or more IP dewrapper circuits

27 which transmit MPEG transport streams to customers, the particular IP dewrapper

28 circuit to which said TCP/IP or UDP/IP packets encoding a particular video-on-

29 demand program are addressed being the one which transmits an MPEG transport

30 stream to a customer which requested said video-on-demand program, and further

31 comprising the step of encapsulating said TCP/IP or UDP/IP packets in a local area

32 network packet addressed to said IP dewrapper circuit;

33   (7) stripping off the local area network packet headers and TCP/IP or

34 UDP/IP packet headers from said local area network packets encapsulating the MPEG

35 packets which encode a particular video-on-demand program and transmitting said

36 MPEG packets to the customer which requested said video-on-demand program as an

37 MPEG transport stream which is modulated in any way and multiplexed, if

38 necessary, in any way onto any suitable downstream logical and physical channel;

39   (8) and wherein step (6) further comprises the steps of:

40   receiving data indicating the available bandwidth for MPEG packet

41   encoding particular video programs;

42   decompressing at least partially the MPEG packets received in each

43   cherrypicker multiplexer;

44   recompressing the video data from MPEG packets encoding each

45   particular video program to the available bandwidth specified for that

46   particular video program; and

47   repacketizing the video data into MPEG packets in an MPEG transport

48   stream.

1   28. (First Embodiment) A process for supplying iData and video data to consumers,

2   comprising the steps of:

3   (1) in a modem coupled to one or more customers by any upstream and

4   downstream data paths, receiving upstream video-on-demand requests and requests

5   for iData and iData command packets, packetizing said requests and commands into

6   local area network packets (hereafter LAN packets) and transmitting LAN packets

7   containing requests for iData and other commands via a local area network to an

8   appropriate server entity which can supply the requested iData or execute the iData

9   command, and transmitting LAN packets containing video-on-demand requests to one

10   or more cherrypicker multiplexers;

11   (2) simultaneously or at different times, receiving in an IP dewrapper

12   circuit one or more MPEG transport streams containing data encoding video

13   programs to be transmitted to one or more consumers;

14   (3) receiving or generating in a web server connected to the internet or any

15   other type of server including an application server one or more TCP/IP or UDP/IP

16   packets of iData and encapsulating them in local area network packets addressed to a

17   modem which will be used to transmit the TCP/IP or UDP/IP packets encapsulated in

18   said LAN packets downstream and transmitting said LAN packets to a packet switch;

19   (4) in said packet switch, routing said LAN packets containing iData to said

20   modem;

21   (5) in said modem, receiving said LAN packets containing iData and

22   transmitting them downstream to the customer which requested said iData;

23   (6) in an IP wrapper circuit, encapsulating one or more MPEG packets of

24   video program data having the same program identification code and input multiplex

25   number (together hereafter referred to as a PID) from said transport streams in the

26   payload portion of an internet protocol packet (hereafter referred to as an IP packet)

27   and mapping the PID of the encapsulated MPEG packets into an IP multicast address

28   used as the destination address of said IP packet;

29   (7) in said IP wrapper circuit encapsulating each said IP packet in a LAN

30   packet and mapping said IP packet multicast destination address into a multicast

31   destination address for the local area network destination address which is unique for

32   each PID;

33   (8) transmitting said LAN packets so generated containing video program data

34   over said local area network to a packet switch;

35   (9) receiving in said packet switch from each of said one or more

36   cherrypicker multiplexers one or more LAN packets containing data indicating the

37   video program data to be routed to said cherrypicker multiplexer and routing

38   incoming LAN packets containing data specified by a cherrypicker multiplexer as

39   desired data to said cherrypicker multiplexer;

40   (10) in each cherrypicker multiplexer, receiving data indicating video-on-

41   demand requests for video programs and transmitting data to said packet switch

42   indicating which LAN packets containing video program data to route to said

43   cherrypicker multiplexer, and sorting incoming MPEG packets by their PIDs into

44   one or more MPEG transport streams to be transmitted to one or more customers and

45   performing the following steps:

46   decompressing at least partially the MPEG packets received in each

47   cherrypicker multiplexer;

48   recompressing the video data from MPEG packets encoding each

49   particular video program to the available bandwidth specified for that

50   particular video program; and

51   repacketizing the video data into MPEG packets and packetizing said

52   MPEG packets in TCP/IP or UDP/IP packets.

1   29. The process of claim 28 wherein said TCP/IP or UDP/IP packets generated by

2   said cherrypicker multiplexer are addressed to the host and process executing on said host at

3   a customer location to which the data encapsulated in said TCP/IP or UDP/IP packets is to be

4   sent, and further comprising the step of transmitting said TCP/IP or UDP/IP packets to said

5   host and process over any downstream logical channel which has TCP/IP or UDP/IP

6   connectivity all the way to said host and process.

1   30. The process of claim 28 wherein said TCP/IP or UDP/IP packets generated by

2 said cherrypicker multiplexer are addressed to an IP dewrapper circuit, and further

3 comprising the steps of:

4   encapsulating said TCP/IP or UDP/IP packets in local area network packets

5 addressed to said IP dewrapper circuit;

6   in said IP dewrapper circuit, receiving said LAN packets and stripping off the

7 LAN packet headers and TCP/IP or UDP/IP packet headers and assembling the

8 encapsulated MPEG packets into MPEG transport streams;

9   transmitting said MPEG transport streams to specific customers over logical

10 channels on any suitable downstream medium; and

11   if said MPEG video data contains video-on-demand video program data for

12 which the host and process at the customer location which requested the video

13 program does not have data regarding which logical channel said requested video

14 program data will be transmitted on and/or what PID the video program data will

15 have, transmitting a downstream message to said host and process which requested

16 said video program data indicating which logical channel said video program will be

17 transmitted on and, if necessary, what PID or PIDs said requested video program data

18 will have.

1 31. (Second Embodiment) A process for supplying video data to consumers, comprising the

2 steps of:

3   (1) in a modem coupled to one or more customers by any upstream and

4 downstream data paths, receiving upstream video-on-demand requests and requests

5 for iData, packetizing said requests into local area network packets (hereafter LAN

6 packets) and transmitting LAN packets containing each request for iData via a local

7 area network to an appropriate server entity which can supply the requested iData

8 along with message data indicating to which of one or more cherrypicker

9 multiplexers to transmit the requested iData, and transmitting LAN packets

10 containing video-on-demand requests to one or more cherrypicker multiplexers;

11   (2) receiving in an IP dewrapper circuit one or more MPEG transport

12 streams containing data encoding video programs to be transmitted to one or more

13 consumers;

14   (3) receiving or generating in a web server connected to the internet or any

15   other type of server including an application server one or more TCP/IP or UDP/IP

16   packets of iData and encapsulating them in local area network packets (hereafter LAN

17   packets) addressed to one or more cherrypicker multiplexers at least one of which

18   will be used to transmit said iData packets downstream in and MPEG transport

19   stream, and transmitting said LAN packets to a packet switch;

20   (4) in said packet switch, routing said LAN packets containing iData to a

21   cherrypicker multiplexer;

22   (5) in each said cherrypicker multiplexer, receiving said LAN packets

23   containing iData and stripping off said LAN packet header and said TCP/IP or UDP/IP

24   packet header and encapsulating the enclosed iData in a TCP/IP or UDP/IP packet;

25   (6) in an IP wrapper circuit, encapsulating one or more MPEG packets of

26   video program data having the same program identification code and input multiplex

27   number (together hereafter referred to as a PID) from said transport streams in the

28   payload portion of an internet protocol packet (hereafter referred to as an IP packet)

29   and mapping the PID of the encapsulated MPEG packets into an IP multicast address

30   used as the destination address of said IP packet;

31   (7) in said IP wrapper circuit encapsulating each said IP packet in a LAN

32   packet and mapping said IP packet multicast destination address into a multicast

33   destination address for the local area network destination address which is unique for

34   each PID;

35   (8) transmitting said LAN packets so generated containing video program data

36   over said local area network to a packet switch;

37   (9) receiving in said packet switch from each of said one or more

38   cherrypicker multiplexers one or more LAN packets containing data indicating the

39   video program data to be routed to said cherrypicker multiplexer and routing

40   incoming LAN packets containing data specified by a cherrypicker multiplexer as

41   desired data to said cherrypicker multiplexer;

42   (10) in each cherrypicker multiplexer, receiving data indicating video-on-

43   demand requests for video programs and transmitting data to said packet switch

44   indicating which LAN packets containing video program data to route to said

45   cherrypicker multiplexer, and sorting incoming MPEG packets containing video data

46   by their PIDs into one or more MPEG transport streams to be transmitted to one or

47   more customers, and performing the following steps:

48   decompressing at least partially the MPEG packets received in each

49   cherrypicker multiplexer;

50   recompressing the data from MPEG packets encoding each particular

51   video program and iData to the available bandwidth specified for that

52   particular video program or iData; and

53   repacketizing the video data and iData into MPEG packets and

54   packetizing said MPEG packets in TCP/IP or UDP/IP packets.

1   32. The process of claim 31 wherein said TCP/IP or UDP/IP packets generated by

2   said cherrypicker multiplexer are addressed to the host and process executing on said host at

3   a customer location to which the video data or iData encapsulated in said TCP/IP or UDP/IP

4   packets is to be sent, and further comprising the step of transmitting said TCP/IP or

5   UDP/IP packets to said host and process over any downstream logical channel which has

6   TCP/IP or UDP/IP connectivity all the way to said host and process.

1   33. The process of claim 31 wherein said TCP/IP or UDP/IP packets generated by

2   said cherrypicker multiplexer are addressed to an IP dewrapper circuit, and further

3   comprising the steps of:

4   encapsulating said TCP/IP or UDP/IP packets in LAN packets addressed to said -

5   IP dewrapper circuit;

6   in said IP dewrapper circuit, receiving said LAN packets and stripping off the

7   LAN packet headers and TCP/IP or UDP/IP packet headers and assembling the

8   encapsulated MPEG packets into MPEG transport streams;

9   transmitting said MPEG transport streams to specific customers over logical

10   channels on any suitable downstream medium; and

11   if said MPEG video data contains video-on-demand video program data for

12   which the host and process at the customer location which requested the video

13   program does not have data regarding which logical channel said requested video

14   program data will be transmitted on and/or what PID the video program data will

15   have, transmitting a downstream message to said host and process which requested

16   said video program data indicating which logical channel said video program will be

17   transmitted on and, if necessary, what PID or PIDs said requested video program data

18   will have.

1   34. (Third embodiment) A process for supplying video data to consumers, comprising the

2   steps for:

3   (1) in a modem coupled to one or more customers by any upstream, receiving

4   upstream video-on-demand requests and requests for iData and iData commands and

5   transmitting them to a control computer;

6   (2) in said control computer transmitting one or more messages to one or

7   more video servers, web servers and/or application servers that can supply the

8   requested data requesting that they supply the requested data and assigning logical

9   channels on which the requested iData and video program data is to be transmitted to

10   the customer and generating downstream messages to be sent to each customer telling

11   the customer which logical channel upon which the data said customer requested will

12   be found;

13   (3) transmitting the requested iData and video program data and downstream

14   message data to one or more cherrypicker multiplexers; and

15   (4) in each cherrypicker multiplexer, adjusting the bandwidth of the video

16   data and/or the iData if necessary and repacketizing said video data and iData and

17   downstream message data in MPEG packets and transmitting said MPEG packets to the

18   customer who requested the data via an MPEG transport stream.

35. A process for supplying video data and iData to consumers, comprising the steps for:

     (1) in a modem coupled to one or more customers by any upstream data path
and any downstream data path compatible with said modem, receiving upstream
video-on-demand requests and requests for iData and iData commands and
transmitting them to a control computer, and receiving downstream iData and
downstream command and control messages, both said iData and said command and
control messages encapsulated in TCP/IP or UDP/IP packets addressed to a host and
process at a customer location, and transmitting said downstream iData and command

and control messages to said customer to which it is addressed over said downstream data path;

(2) in said control computer transmitting one or more messages to one or more video servers, web servers and/or application servers that can supply the requested video data and iData requesting that they supply the requested video data and iData and assigning logical channels on which the requested video program data is to be transmitted to the customer and generating downstream command and control messages to be sent to each customer telling the customer which logical channel upon which the video-on-demand data said customer requested will be found;

(3) transmitting the requested video program data to one or more cherrypicker multiplexers; and

(4) in each cherrypicker multiplexer, adjusting the bandwidth of the video data of each video program if necessary to a smaller bandwidth and repacketizing said video data in MPEG packets and transmitting said MPEG packets to the customer who requested the data via an MPEG transport stream.

1   36. The process of claim 35 wherein said modem is a DOCSIS cable modem and said
2 upstream and downstream data paths are hybrid fiber coaxial cable plants.

1   37. The process of claim 35 wherein said modem one or more digital subscriber line
2 modems, and said upstream and downstream data paths are digital subscriber lines.

1   38. The process of claim 35 wherein said modem is a conventional telephone line
2 modem and a satellite uplink transmitter and wherein said upstream data path is a
3 conventional POTS telephone line and said downstream data path is a satellite uplink, a
4 satellite transponder and a satellite downlink and satellite receiver at the customer site.

1   39. A process for supplying video data to consumers, comprising the steps for:
2   (1) in a modem coupled to one or more customers by any upstream and any
3 downstream data path, receiving upstream video-on-demand requests and requests
4 for iData and iData commands and transmitting them to a control computer, and

5   receiving downstream command and control messages from said control computer and

6   transmitting them to customers over said downstream data path via said modem;

7   (2) in said control computer transmitting one or more messages to one or

8   more video servers, web servers and/or application servers that can supply the

9   requested data requesting that they supply the requested video data and iData and

1 0   assigning logical channels on which the requested iData and video program data is to

1 1   be transmitted to the customer and generating downstream command and control

1 2   messages to be sent to each customer telling the customer which logical channel upon

1 3   which the iData and video program data said customer requested will be found;

1 4   (3) transmitting the requested iData and video program data to one or more

1 5   cherrypicker multiplexers; and

1 6   (4) in each cherrypicker multiplexer, adjusting the bandwidth of the video

1 7   data and/or the iData, if necessary, to a smaller bandwidth, and repacketizing said

1 8   video data and iData in MPEG packets and transmitting said MPEG packets to the one

1 9   or more customer who requested the data via one or more logical channels as one or

2 0   more MPEG transport streams.

1   40. The process of claim 39 wherein said modem is a DOCSIS cable modem and said

2   upstream and downstream data paths are hybrid fiber coaxial cable plants.

1   41. The process of claim 39 wherein said modem one or more digital subscriber line

2   modems, and said upstream and downstream data paths are digital subscriber lines.

1   42. The process of claim 39 wherein said modem is a conventional telephone line

2   modem and a satellite uplink transmitter and wherein said upstream data path is a

3   conventional POTS telephone line and said downstream data path is a satellite uplink, a

4   satellite transponder and a satellite downlink and satellite receiver at the customer site.